

REMARKS

This is in response to the Office Action dated May 20, 2010. In view of the above amendments and the following remarks, reconsideration of the rejection and further examination are requested.

By this amendment, claim 16 has been cancelled and incorporated into independent claim 1, and new independent claim 19, which incorporates the limitations of original claims 1, 9, and 15, has been added.

The specification has been amended to correct the misnumbered equations and spelling error identified by the Examiner. As a result, Applicants respectfully request that the Examiner withdraw the objection to the specification.

Rejections under 35 U.S.C. §112, first paragraph

Claim 16 has been rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Claim 16 has been cancelled and incorporated into claim 1. This rejection is submitted to be inapplicable to the claim 1 for the following reasons.

Claim 1 recites an omnidirectional camera. The Examiner has asserted that Figure 1 does not support the omnidirectional camera as recited in claim 1. The Examiner appears to be taking the position that, because the camera does not protrude from the end of the endoscope, there is no way for light to enter from the sides (see Office Action, paragraph [10]).

In the omnidirectional camera shown in Figure 3, the hyperboloidal mirror 42 faces downward and reflects light downward to the imaging unit 44 (see present application, paragraphs [0053] – [0056]). Thus, as the Examiner has asserted, light must be able to enter the camera 32 from the sides.

However, Figure 1 does not preclude the above discussed interpretation of light entering the camera from the sides. Figure 1 is a schematic drawing of a probe-type endoscope (see present application, paragraph 49). The tip portion 24 of the probe-type endoscope 20 is provided with an omnidirectional camera 32, a light 34, forceps 36, and a rinse water injection port 38 (see present application, paragraph 49). These elements are all represented in Figure 1 with placeholder circles of varying diameters. Figure 1 is not meant to show the detail of any one of these particular features, and a lack of detail in Figure 1 does not negate the adequate written description in the specification.

The specification makes it clear that the omnidirectional camera used in Figure 1 is the HyperOmni Vision camera, whose function is described in Figure 3 (see present application, paragraph 54). The HyperOmni Vision camera is composed of a hyperboloidal mirror 42 positioned to face downward, and an imaging unit which receives the reflected light (see present application, paragraph 56). In this way, the omnidirectional camera can take 360 degree images of its surroundings (see present application, paragraph 50). For the Examiner's convenience, the reference "Omnidirectional Visual Sensors for Navigation of Mobile Robots" by Yamazawa et al., which discloses the above discussed HyperOmni Vision camera, has been submitted concurrently with this amendment in an Information Disclosure Statement.

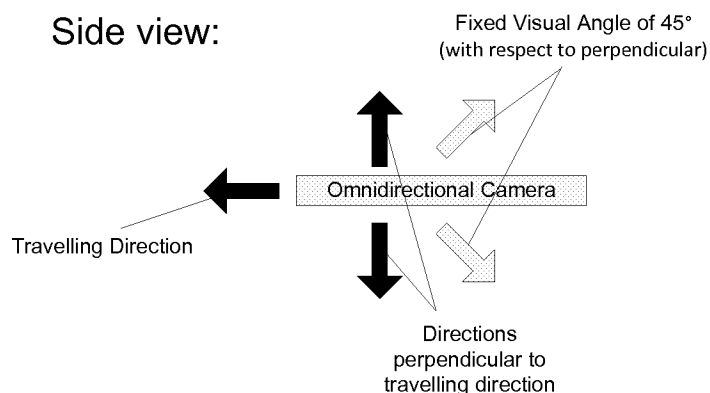
In view of at least these disclosures, it is clear that the application includes an adequate written description of the invention under 35 U.S.C. §112, first paragraph.

Rejections under 35 U.S.C. §112, second paragraph

Claims 9 and 14-16 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This rejection is submitted to be inapplicable to the claims, as amended, for the following reasons.

Claims 9 and 14-15 have been amended to recite "energy" in place of "predetermined energy," as interpreted by the Examiner (see Office Action, page 5).

In addition, claim 1 (incorporating the limitations of claim 16) has been amended to recite that the panoramic image is generated such that the panoramic image has a fixed visual angle with respect to each of the directions perpendicular to a traveling direction of said omnidirectional camera by performing video mosaicking on the plurality of images obtained by the omnidirectional camera. The omnidirectional camera has a sufficient view angle for the lateral field of view, and therefore video images taken by the camera include not only images of the inner walls of the digestive organs that are seen in front of the side surface (i.e., images taken in the perpendicular direction), but also images taken at a given visual angle (see present application, paragraph [0040]). This is depicted below with reference to the following explanatory figure.



As shown above, the omnidirectional camera has a traveling direction indicated by a black arrow. In addition, the other black arrows represent the directions perpendicular to the traveling direction (note that as a 2-D representation, only 2 perpendicular directions are shown). The fixed visual angle shown here is 45° with respect to the direction perpendicular to the traveling direction. However, this angle is merely shown as an example. The actual fixed visual angle could be any of a number of angles. Note that because of the 2-D nature of the figure, both of the 45° arrows together represent one fixed visual angle with respect to the perpendicular. The actual creation of the panoramic image obtained from the images taken by the omnidirectional camera is explained with reference to Figures 9A-9D of the present application in paragraphs [0065] – [0067].

Since each image includes a range of view, when performing video mosaicking, a fixed angle in each image is used to generate the panoramic image, resulting in a panoramic image having this fixed angle. Thus, if 45° is selected as the fixed angle in the plurality of images from the camera, then the panoramic image is a mosaic of a plurality of 45° angled images moving in the traveling direction. As a result, "the panoramic image has a fixed visual angle" of 45° in this example.

In light of the above explanation of the fixed visual angle, it is submitted that claim 1 is in compliance with 35 U.S.C. §112, second paragraph. As a result, Applicants respectfully request that the Examiner withdraw the rejection.

Rejections under 35 U.S.C. §103(a)

Claims 1, 9, and 14 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Gombrich (US 6,081,740) in view of Heung-Yeung Shum and R. Szeliski (“Construction and Refinement of Panoramic Mosaics with Global and local Alignment,” Proc. Int’l Conf. Computer Vision, pp. 953-958, 1998).

In addition, claim 17 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Gombrich (US 6,081,740) in view of Heung-Yeung Shum and R. Szeliski (“Construction and Refinement of Panoramic Mosaics with Global and local Alignment,” Proc. Int’l Conf. Computer Vision, pp. 953-958, 1998) and further in view of Belson (US Pub. 2005/0165276). These rejections are submitted to be inapplicable to the claims, as amended, for the following reasons.

In the Office Action dated May 20, 2010, the Examiner noted that claims 15 and 16 would be allowable if rewritten to (i) include all of the limitations of the base claim and any intervening claims, and (ii) overcome the rejections under 35 U.S.C. §112.

Claim 1 has been amended to include all the features of claim 16. In addition, new independent claim 19 has been added which incorporates the limitations of claims 1, 9, and 15. For the reasons discussed above, it is believed that claims 1 and 19 are in compliance with 35 U.S.C. §112. As a result, claims 1 and 19 are patentable over the cited prior art.

Claims 9, 14, and 17 are either directly or indirectly dependent on independent claim 1. As a result, claims 1, 9, 14, 17, and 19 are allowable over the cited prior art.

Withdrawn claims 2-8, 10-13, and 18 have been amended similarly to the above discussed claims 1, 9, 14, and 17. In addition, withdrawn claims 2-8, 10-13, and 18 incorporate all the limitations of allowable claim 1. Therefore, Applicants respectfully request rejoinder of withdrawn claims 2-8, 10-13, and 18.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. The examiner is invited to contact the undersigned by telephone if it is felt that there are issues remaining which must be resolved before allowance of the application.

Respectfully submitted,

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